



Shaw Environmental & Infrastructure, Inc

Geotechnical Laboratory
304 Directors Drive
Knoxville, TN 37923
(865) 690-3211***CERTIFICATE OF ANALYSIS***

Mr. Michael Neely
CH2M Hill Plateau Remediation Company
P.O. Box 1600
Mail Stop – B6-06
Richland, WA 99352

October 12, 2010

This is the Amended Certificate of Analysis for the following samples:

Shaw Project ID: Eberline Analytical
Shaw Project Number: 139736
Date Received by Lab: 07/23/2010
Number of Samples: One
Sample Type: Soil

I. Introduction/Case Narrative

This is an amended report for the original issued on September 1, 2010. The amendment corrects the client sample number found on the hydraulic conductivity/permeability data report found on page 8.

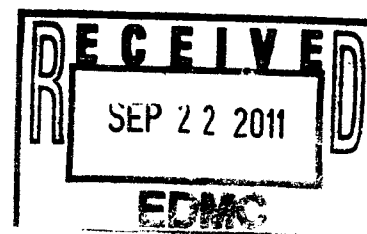
One soil samples was received by the Shaw Geotechnical Laboratory on July 23, 2010. The sample was submitted for determination of bulk density, saturated hydraulic conductivity/permeability, and moisture content. The sample number received was B25YX5.

Please see Appendix A, Sample Number Cross Reference List; Appendix B, Analysis Results; Appendix C, Chain-of-Custody/Sample Receipt Records.

"I certify that this data package is in compliance the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the laboratory manager or a designee, as verified by the following signature."

Reviewed and Approved:

R. Gregory Bennett
Geotechnical Laboratory Manager, Technology Applications Group



II. Analytical Results/Methodology

REFERENCES: United Nations, *Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria*, third ed. New York, 1999. United States Army Corps of Engineers (USACE), Engineer Manual 1110-2-1906, *Laboratory Soils Testing*, appendix II, 1970; United States Environmental Protection Agency, SW846, *Test Methods for Examining Solid Waste, Physical/Chemical Methods*, 3rd ed., Nov 1986 (EPA SW-846). Annual Book of ASTM Standards, Section 4, Construction, Volume 04.08, *Soil and Rock (I)*, and Volume 04.09, *Soil and Rock (II)*, 2008. Shaw Environmental and infrastructure, Standard Operating Procedures.

Bulk Density ASTM D 2937
Moisture Content of Soil and Rock ASTM D 2216
Permeability ASTM D 5084

III. Quality Control

Quality control checks such as duplicates and spikes (QC samples), are not normally applicable to geotechnical testing. This is due largely to the inability of obtaining samples with known characteristics, the heterogenous nature of the samples, and quality control procedures built-in to the analytical method.

QC measures to ensure accuracy and precision of test results include the following:

- 100% verification of all numerical results - raw data entries, transcriptions and calculations entered by lab technicians are checked, recalculated and verified. Most data calculations are performed by computer programs.
- Data validation through test reasonableness - summaries of all test results for individual reports are reviewed to determine the overall reasonableness of data and to determine the presence of any data that may be considered outliers.
- Quality control procedures are built into most standardized geotechnical procedures. For example, liquid limit and plastic limit analyses call for re-analyses and specify acceptance criteria.
- Routine instrument calibration - instruments, gauges and equipment used in testing are calibrated on a routine basis. All instrument calibration follows ASTM or manufacturer guidelines.
- Maintenance of all past calibration records - calibration records and certification documents of all instruments, gauges and equipment are updated routinely and maintained in the Quality Control Coordinators Quality/Operations files.

- Certified and trained personnel - all technicians are trained in the application of standard laboratory procedures for geotechnical analyses as well as the quality assurance measures implemented by Shaw.
- Quantitative analyses frequently used in geotechnical/physical testing programs do not use QC tools common to wet chemistry or radiochemistry laboratories. Measures not employed in the analysis of samples reported in this report include: laboratory control samples (LCS), blanks, matrix spikes (MS), duplicate analyses, dilutions, digestions, correction factors, surrogate sample analyses, detection limit determinations, control charts, and/or tentatively identified compounds (TICs).

IV. Data Qualification

None.

Appendix A
Sample Cross-Reference List

Shaw
Geotechnical Laboratory
Knoxville, TN
(865) 690-3211

SAMPLE NUMBER CROSS-REFERENCE LIST

Lab Sample ID	Client Sample ID	MATRIX
SEK 4816	B25YX5	SOIL

Appendix B
Data Results

BULK DENSITY/DRY DENSITY
ASTM D 2937

PROJECT NAME:

Eberline Analytical

PROJECT NUMBER:

139736.03000000

[illegible]

Moisture content calculated by ASTM D 2216 based on sample dry weight.

Bulk density is the weight of wet sample divided by the volume of the wet sample (as-received).

Dry density is the weight of the dry sample solids divided by the volume of the original sample.

Report No.: EBER0910020

Mr. Michael Neely

Client: CH2M Hill Plateau Remediation Company

Shaw Project Name: Eberline Analytical

Shaw Project No.: 139736

Shaw
Geotechnical Laboratory
Knoxville, TN
(865) 690-3211

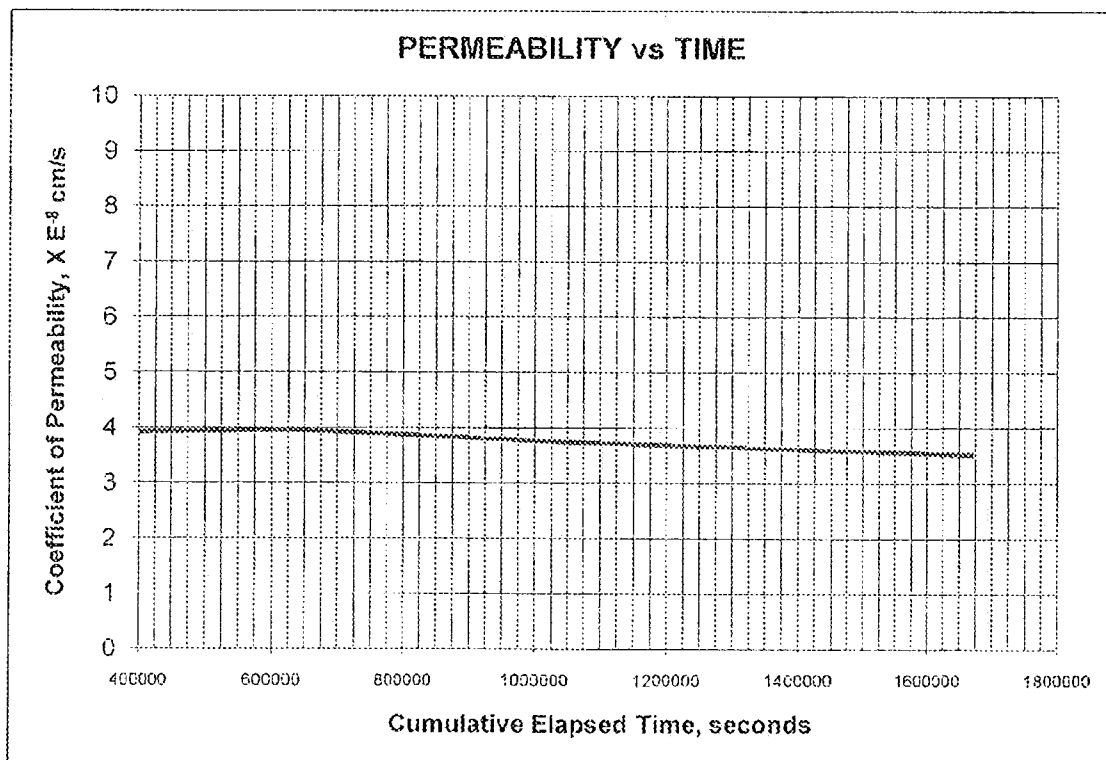
HYDRAULIC CONDUCTIVITY / PERMEABILITY
ASTM D 5084

PROJECT NAME: Eberline Analytical
 PROJECT NO. 139736.01000000

CLIENT SAMPLE NO. B25YX5
 LAB SAMPLE NO. SEK 4816

	INITIAL	FINAL		
Specimen diameter, cm	7.11		Hydraulic gradient	25.7
Specimen length, cm	10.94		Min. consolidation stress, psi	2.0
Wet weight of specimen, g.	911.44		Max. consolidation stress, psi	6.0
Specimen cross-sect. area, cm ²	39.74		Total backpressure, psi	36.0
Water content, %	15.8		Permeant Fluid	Deaired DI Water
Wet unit weight, pcf	130.9			
Dry unit weight, pcf	113.0			
Est. degree of saturation, %	90.4	90.4		
Specific gravity of solids, assume	2.65			

Coefficient of Permeability, cm/s **3.7E-08**



Appendix C
Chain of Custody Records

[illegible]